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High Current Pulsed Positron Microprobe

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We are developing a low energy, .5 -50 keV, microscopically focused, <1 micron, pulsed, 100 ps, positron beam for defect analysis by positron lifetime spectroscopy to provide a new defect analysis capability at the high current positron source. The Lawrence Livermore National Laboratory electron linac is now capable of providing currents up to 10^{10} $e^{+}s^{-1}$. When completed the pulsed positron microprobe will enable defect specific, 3-dimensional maps of defect concentrations with sub-micron resolution of defect location. By coupling these data with first principles calculations of defect specific positron lifetimes and positron implantation profiles we will both map the identity and concentration of defect distributions. We will describe elements of the pulsed positron microprobe design, progress in its construction and uses of the instrument in studying defect distributions in materials.

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